CLAIM AMENDMENTS

1. (currently amended) A diode-pumped laser apparatus for generating a visible power beam, ~~of the type~~ the laser apparatus comprising:

a linear ~~miniaturized~~ laser cavity ~~(72) 5~~ having crystals and a length that does not exceed the sum of ten times the sum of the lengths of the crystals; ~~comprising at least the following optical elements (30,33,36,10,20): -~~

~~reflecting means~~ a plurality of reflectors ~~(30;33;36)~~ that are highly reflective at a fundamental wavelength of a laser beam [[(52)]] generated by ~~said cavities~~ the laser cavity [[(72)]], at least one of said ~~reflecting means~~ reflectors [[(30)]] being traversed by a pumping beam, ~~(54), at least one of said reflecting means (36) being~~ and reflecting at said fundamental wavelength and a second harmonic wavelength [[(51)]] with respect to said fundamental wavelength, and ~~at least one of said reflecting means (33)~~ being highly transmissive at said second harmonic [[(51)]] of said fundamental wavelength; [[-]]

an active material [[(10)]] with linear polarized emission and with a gain configuration with small thermal aberration for [[the]] cavity mode, said active material [[(10)]] being able to generate said laser beam [[(52)]] at [[a]] the fundamental wavelength; [[-]]

a nonlinear crystal [[(20),]] inside said cavity ~~(72) ,~~ ~~characterized in that: said nonlinear crystal (20) is~~ and able to generate a second harmonic [[(51)]] of said fundamental wavelength by critical type I phase matching; and ~~that said cavity (72) is associated to~~

thermostating means associated with the cavity ~~(45;41;42,43;44)~~ for temperature locking said cavity, the reflectors, the active material, and the nonlinear crystal ~~(72) and its optical elements (30 ,33 ,36 ,10 ,20)~~.

2. (currently amended) The [[an]] apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein said cavity [[(72)]] and the optical ~~means (30,33,36,10,20) which~~ elements it comprises are ~~selected~~ provided to ~~minimis~~ minimize optical losses.

3. (currently amended) [[An]] The apparatus [[as]] claimed in claim 1 ~~, characterized in that said~~ wherein optical losses at said fundamental wavelength are less than 2%.

4. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1 ~~, characterized in that said~~ wherein optical losses at said fundamental wavelength due to thermal aberration are less than 1%.

5. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein the active material [[(10)]] is a crystal of Nd:$GdVO_4$.

6. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein the active material [[(10)]] is a crystal of Nd:YLF.

7. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1~~, characterized in that~~ wherein the active material [[(10)]] is a crystal of Nd:YVO_4.

8. (currently amended) The [[An]] apparatus [[as]] claimed in claim 5 ~~, characterized in that~~ wherein the nonlinear crystal is LBO.

9. (currently amended) The [[An]] apparatus [[as]] claimed in claim 5 ~~, characterized in that~~ wherein the nonlinear crystal is YCOB or GdCOB.

10. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein said visible beam ~~(51) is a beam~~ is at the limit of diffraction [[,]] or $TEM_{0,0}$.

11. (currently amended) The [[An]] apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein the pumping beam [[(54)]] is absorbed in two successive passes through the active material [[(10)]].

12. (currently amended) The apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein said thermostating means ~~(45;41;42,43;44)~~ for temperature locking said cavity, the reflector, the active material, and the nonlinear crystal ~~(72) and its optical elements~~ comprise a mechanical structure ~~(45;41;42,43;44)~~ associated [[to]] with said cavity [[(72)]].

13. (currently amended) The apparatus [[as]] claimed in claim 12 ~~, characterized in that~~ wherein said mechanical structure comprise a structural base [[(45),]] and elements for supporting the optics ~~(41;42,43;44)~~.

14. (currently amended) The apparatus [[as]] claimed in claim 12 ~~, characterized in that~~ wherein said structural base [[(45)]] and elements supporting the optics ~~(41;42,43;44)~~ are made of copper or other heat conducting material and ~~associated~~ are in thermal contact with each other.

15. (currently amended) The [[An]] apparatus [[as]] claimed in claim 12 ~~, characterized in that~~ wherein the temperature of the structural base [[(45)]] is regulated by means of an active system.

16. (currently amended) The [[An]] apparatus [[as]] claimed in claim 12 wherein ~~characterized in that~~ said mechanical structure ~~(45;41;42,43;44)~~ has the shape of a container, containing said cavity [[(72)]] in sealed way.

17. (currently amended) The apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein said thermostating means ~~(45;41;42,43;44)~~ comprise an additional autonomous heat-regulating device to stabilize the temperature of the nonlinear crystal [[(20)]] in autonomous and more precise way than the other elements of the cavity.

18. (currently amended) The apparatus [[as]] claimed in claim 1 ~~, characterized in that~~ wherein the ~~reflecting means~~ reflectors ~~(30;33;36)~~ are at least in part ~~obtained by means of~~ formed by reflecting depositions on the laser crystal [[(10)]] [[and/]] or on the nonlinear crystal [[(20)]].

19. (currently amended) A method for generating a visible laser beam in a laser cavity [[(72)]] of the type whereby a nonlinear crystal [[(20)]] is inserted into said laser cavity [[(72)]] to obtain said visible laser beam [[(51)]] through a second harmonic generation operation, ~~characterized in that it comprises the following operations~~ the method comprising the steps of: [[-]]

selecting a nonlinear crystal [[(20)]] cut for critical type I phase matching; [[-]]

aligning said nonlinear crystal [[(20)]] at a temperature predetermined by [[the]] a thermostating means [[(45)]] associated [[to]] with said cavity [[(72)]] obtaining the phase matching condition; [[-]]

optimizing the conversion into second harmonic with additional small temperature adjustments around the predetermined value.

20. (currently amended) The method [[as]] claimed in claim 19 ~~, characterized in that~~ wherein the temperature regulation operation occurs in negative feedback, detecting [[the]] an actual-value signal of a sensor positioned in proximity to the nonlinear crystal.

21. (currently amended) The [[A]] method [[as]] claimed in claim 19, ~~characterized in that it further comprises the operations~~ further comprising the steps of: [[-]]

reducing [[the]] walk-off of the fundamental laser beam [[(52)]] operating on the dimension of the cavity mode inside the nonlinear crystal [[(20)]], in order to contain [[the]] a walk-off angle inside the divergence of the beam; [[-]]

selecting the length of the nonlinear crystal as a function of the desired focusing.

22. (new) The apparatus according to claim 1 wherein the active material is arranged to keep the aberration losses at less than 2%.